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Running and Mortality: Is More Actually Worse?

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Abstract

In follow-up to our recent state-of-the-art review on running published in the November 2015 issue of Mayo Clinic Proceedings, 1 we have additional data regarding the relationship of high-dose running with prognosis. Clearly, observational studies have recently reported that leisure-time running provides mortality benefits. However, the dose-response relationship between running and mortality has been increasingly debated, specifically whether more running is better or worse.

Disciplines

Community Health and Preventive Medicine | Exercise Science | Expeditionary Education | Kinesiology

Comments

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Running and Mortality: Is More Actually Worse?

To the Editor: In follow-up to our recent state-of-the-art review on running published in the November 2015 issue of *Mayo Clinic Proceedings*,[1] we have additional data regarding the relationship of high-dose running with prognosis. Clearly, observational studies have recently reported that leisure-time running provides mortality benefits. However, the dose-response relationship between running and mortality has been increasingly debated, specifically whether more running is better or worse.

The Copenhagen City Heart Study (CCHS) indicated a reverse J-shaped association between weekly jogging time or frequency and all-cause mortality, suggesting loss of mortality benefits with higher doses of jogging at 2.5 hours or more per week or 4 times or more per week in a relatively healthy cohort (N=5048).[2] Similarly, our recent analysis of running and cause-specific mortality suggested a reverse J-shaped association, specifically on coronary heart disease mortality, unlike other causes of death.[3] Data from the National Runners' and Walkers' Health Studies (NRWHS) of 2377 heart attack survivors also indicated a reverse J-shaped association of running or walking with all-cause and cardiovascular disease (CVD) mortality, with loss of benefit at high exercise doses.[4] Both the CCHS and NRWHS have limitations. The CCHS had relatively small numbers of deaths and used sedentary nonjoggers—ie, without including active nonjoggers who are active in other types of physical activity except jogging—as the reference group in their analysis. This factor, in turn, may contribute to greater mortality benefits in joggers. The NRWHS had no nonrunning inactive control group but used inadequate exercisers (<1.07 metabolic equivalent task [MET]−h/d) as the reference group in their analyses.

In our large study of running and mortality from the Aerobics Center Longitudinal Study (ACLS) in 55,137 participants (13,016 runners [24%] and 3413 deaths [6%]),[5] we found different results. Specifically, we found significantly lower all-cause and CVD mortality risks even in the highest quintiles of running doses compared with no running, although mortality benefits trended slightly less at the highest quintiles.

Current Study. In the current study, the large sample size from the ACLS allowed us to further investigate whether "more is better or worse" regarding running and mortality. Participants in the highest quintiles of running doses were additionally classified into 3 tertiles of running time, distance, frequency, and total amount. Detailed information on the study design and the assessment of running has been described previously.[5] We found that the mortality benefits were not significant in the highest tertiles of running compared with no running ($P \geq .05$) (Figure), similar to the findings of the other major running studies mentioned previously. However, although there was apparent loss of benefit in the highest-dose runners, partly due to the smaller numbers and wider confidence intervals (CIs), there was no increase in mortality but rather a declining trend in benefit in all-cause and CVD mortality, even at the highest dose compared with nonrunners. Therefore, there may be no remarkable increase in mortality risk compared with nonrunners no matter how much one runs, although there also may be no mortality benefits in excessive running.

Another interesting and important question focuses on the effects of high doses of running compared with low doses of running. (Low-dose running generally provided the most favorable mortality benefits in all 3 of the previously discussed studies.) In the CCHS, considering both duration and speed of jogging, the authors found that the moderate and strenuous joggers who jogged more or at a faster speed (≥4 times/wk or ≥2.5 h/wk at <7 mph or any running at ≥7 mph) (to convert to kph, multiply by 1.6) had 3-fold and 9-fold significantly increased risks of mortality, respectively, compared with light joggers, who jogged less at a slower speed (<2.5 h/wk at ≤7 mph). However, their analyses included very small numbers of deaths in the light (n=7), moderate (n=8), and strenuous (n=2) joggers. The NRWHS also reported similar results using total amount of running/walking based on both duration and speed. Cardiovascular disease mortality increased 2-fold in the group with the highest amount of running/walking (≥7.2 MET-h/d) compared with the group with the lower amount (3.6-7.2 MET-h/d), with a hazard ratio (HR) (95% CI) of 1.97 (1.00-3.67) (P=.05), based on 13 deaths in the highest running/walking group.

We conducted similar analyses and found different results, indicating no significant differences in all-cause mortality (HR, 1.27; 95% CI, 0.89-1.81; P=.19) and CVD mortality (HR, 1.66; 95% CI, 0.87-3.16; P=.12) in the highest (≥2944 MET-min/wk, which is equal to ≥7 MET-h/d) compared with the lowest (<506 MET-min/wk, which is equal to <1.2 MET-h/d) amounts of running, although HRs were greater in those at the highest exercise levels. Similar results were observed in both men and women, with HRs (95% CIs) of 1.21 (0.84-1.75) and 1.84 (0.95-3.54) for all-cause and CVD mortality, respectively, in men and 3.07 (0.79-11.91) for all-cause mortality in women (there were no CVD deaths in women running the highest running amount). Similar results were also found in young and old individuals (<50 vs ≥50 years) with HRs (95% CIs) of 1.57 (0.98-2.51) and 2.01 (0.81-5.02) for all-cause and CVD mortality, respectively, in young individuals and 0.93 (0.52-1.64) and

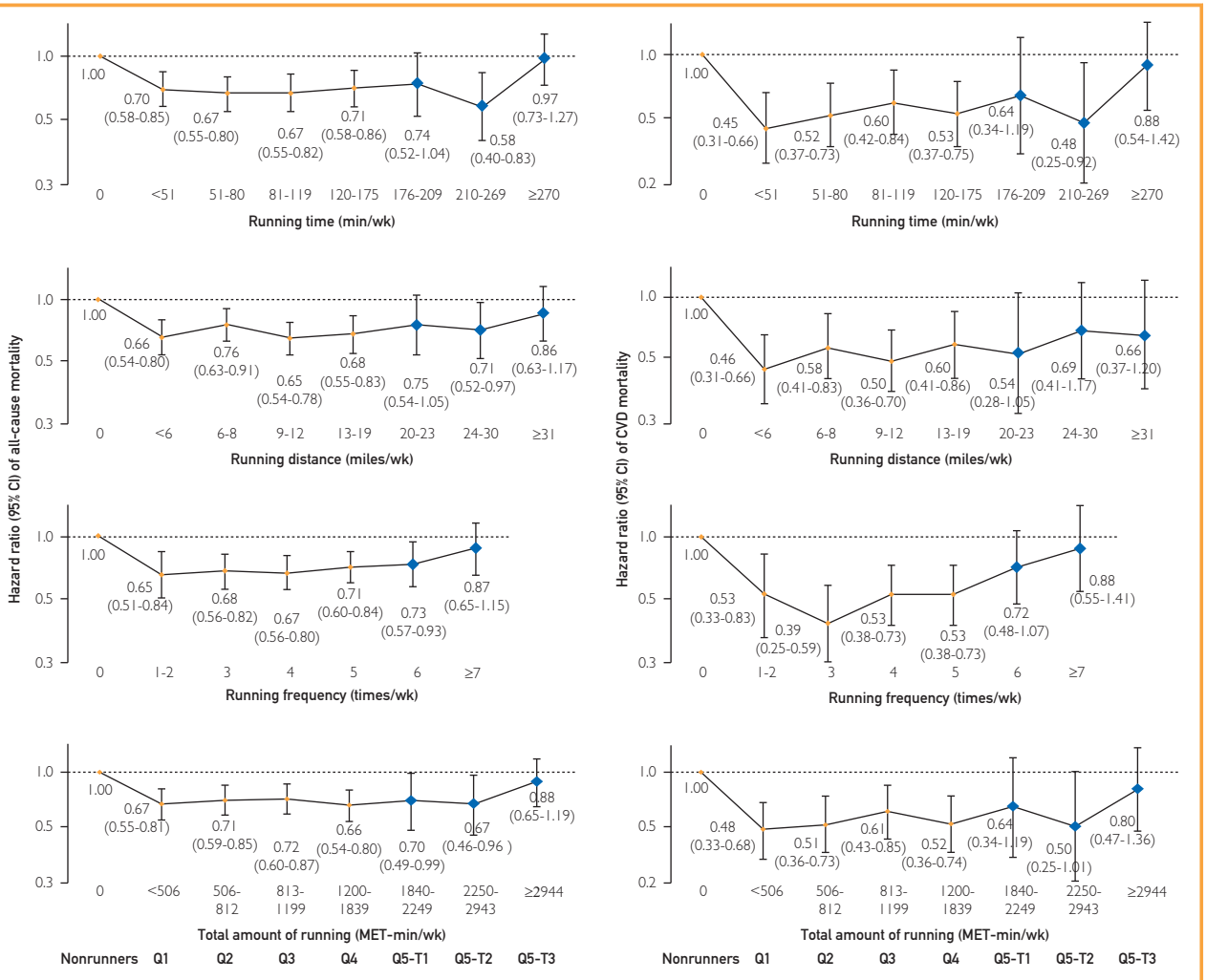

FIGURE. Hazard ratios of all-cause and cardiovascular disease (CVD) mortality by weekly running time, distance, frequency, and total amount. Participants were classified into 8 groups: nonrunners and 5 quintiles of each running dose (Q1 to Q5) with the last quintile (Q5) additionally categorized into 3 tertiles (Q5-T1, Q5-T2, and Q5-T3) using larger markers (7 groups for running frequency because of limited numbers in ≥7 times/wk). All hazard ratios were adjusted for baseline age (years), sex, examination year, smoking status (never, former, or current), alcohol consumption (heavy drinker or not), other physical activities except running (0, 1-499, or ≥500 metabolic equivalent task minutes per week [MET-min/wk]), and parental CVD (yes or no). The number of participants (number of all-cause deaths) were 42,121 (2857), 2710 (110), 2584 (116), 2505 (103), 2647 (112), 850 (33), 822 (30), and 898 (52) in the corresponding 8 running time groups from nonrunners to Q5-T3; 42,121 (2857), 2626 (105), 2473 (120), 2961 (123), 2218 (92), 885 (36), 1027 (40), and 826 (40) in running distance; 42,121 (2857), 2757 (62), 3076 (105), 2817 (131), 2500 (143), 1215 (66), and 651 (49) in running frequency; and 42,121 (2857), 2609 (109), 2598 (122), 2558 (116), 2626 (105), 863 (31), 886 (30), and 876 (43) in total running amount. The number of participants (number of CVD deaths) were 40,319 (1055), 2628 (28), 2501 (33), 2435 (33), 2567 (32), 827 (10), 801 (9), and 863 (17) in the corresponding 8 running time groups from nonrunners to Q5-T3; 40,319 (1055), 2550 (29), 2386 (33), 2874 (36), 2156 (30), 858 (9), 1001 (14), and 797 (11) in running distance; 40,319 (1055), 2714 (19), 2993 (22), 2725 (39), 2396 (39), 1174 (25), and 620 (18) in running frequency; and 40,319 (1055), 2531 (31), 2508 (32), 2477 (35), 2553 (32), 842 (10), 864 (8), and 847 (14) in total running amount. The bars indicate 95% CIs, and hazard ratios appear next to the bars.

1.19 (0.47-3.02) for all-cause and CVD mortality, respectively, in old individuals. Moreover, slow and fast runners (<6.7 vs ≥6.7 mph, using median speed) had similar results, with HRs (95% CIs) of 1.54 (0.79-2.99) and 1.24 (0.37-4.18) for all-cause and CVD mortality, respectively, in slow runners and 1.41 (0.87-2.28) and 2.47 (0.98-6.21) for all-cause and CVD mortality, respectively, in fast runners. Therefore, our findings from a considerably larger number of runners and deaths suggest again that there may be no substantially increased mortality

risk associated with a higher amount of running, even compared with a lower amount of running (which provided the maximal mortality benefits), although it is still possible that more may be worse. Therefore, further exploration is clearly warranted to investigate whether there is an optimum upper limit of running beyond which additional running produces adverse health effects.

Conclusion. People run not only to improve health but also for competition, fitness, weight management, stress relief, socialization, or fun. As a popular and convenient leisure-time physical activity, running provides numerous additional health benefits, including lower risks of obesity, hypertension, dyslipidemia, type 2 diabetes, stroke, osteoarthritis, and certain cancers.[1] Many studies, including ours, support that a small amount of running, even below the current minimum guidelines (<75 min/wk), can substantially reduce mortality risk and extend life. Despite the study limitations, our results clearly suggest that regarding running and mortality, "more is not better," and our highest runners (still only in the low to mid 30 miles per week range) had a trend of loss of benefit; nevertheless, these highest runners still had trends of lower mortality than did nonrunners and only a nonsignificant trend of higher mortality than did the lower-dose runners ($P \geq .05$). Therefore, until we have more compelling evidence on running doses and mortality, we should emphasize that "even a little is great" rather than debating whether "more is better or worse" from a public health perspective.

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Factors Affecting Burnout in Physicians

To the Editor: I appreciated the insightful data presented by Shanafelt et al[1] in their article in the December 2015 issue of *Mayo Clinic Proceedings*, and I share the concerns about burnout rates among physicians in the United States. Although burnout is undoubtedly a multifactorial issue, one wonders about the role of recent federal mandates.

Speaking as an endocrinologist who is engaged in the care of patients daily, a major source of stress stems from the implementation of electronic medical records (EMRs), the pressure from the federally mandated Meaningful Use programs that provide incentives to physicians who meet the implementation criteria, and the financial penalties imposed on those who do not.[2] Although the goals may be beneficent—ie, to track and share clinical conditions and to use the information to engage patients and their families—the reality is that the currently employed EMR often results in needlessly complicated tasks for the physician with questionable clinical benefit to the patient. In addition, clinical notes have become much lengthier because of required information and verbiage, without containing more relevant data that have utility for the reader. Physician EMR training requires hours to complete, while familiarization with the system requires months of use. In addition, each upgrade of existing systems to meet the next stage of Meaningful Use is costly. Indeed, some senior physicians in our health care practice group have opted to retire early rather than be burdened by the "forced" complicated digitization of patient records.

Another issue relevant to physicians concerns obtaining supplies for Medicare patients. No longer is a prescription for glucometer strips for an insulin-dependent diabetic patient sufficient; health care professionals now need to justify why a patient needs to test more than 3 times a day and must periodically complete paperwork attesting to this need. Clinics are asked by some suppliers to keep a copy of patient glucose logs over a 6-month period. For patients requiring diabetic shoes, Medicare does not consider a podiatrist's